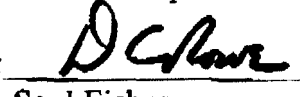
V. CONCLUSION

The NRPM set forth three models for Commission leadership in providing for LEC-CMRS interconnection. Considerations of both law and policy indicate that it should adopt the first model whereby it will "adopt a federal interconnection policy framework...with respect to interstate services" and that would "serve as a model for State commissions considering these issues with respect to intrastate services." The Commission should terminate this proceeding. Instead, it should dedicate its efforts to the Interconnection Proceeding and to a comprehensive evaluation of interstate LEC access charges in the Access Charge Reform Proceeding. In this way it can serve as a leader in guiding both federal and State telecommunication policies into the fully competitive future.

Respectfully submitted,

New England Telephone & Telegraph Company
New York Telephone Company

By: 

Saul Fisher
Donald C. Rowe

1111 Westchester Avenue
White Plains, New York 10604
Telephone (914) 644-6993

Its Attorneys

Dated: March 4, 1996

Exhibit A

NATIONAL ECONOMIC
RESEARCH ASSOCIATES
ONE MAIN STREET, CAMBRIDGE, MASSACHUSETTS 02142
TEL: 617.621.0444 FAX: 617.621.0336

nera
Consulting Economists

AFFIDAVIT CONCERNING INTERCONNECTION BETWEEN LOCAL EXCHANGE CARRIERS AND COMMERCIAL MOBILE RADIO SERVICE PROVIDERS

CC Docket No. 95-185

by

William E. Taylor

March 4, 1996

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AFFIDAVIT CONCERNING INTERCONNECTION BETWEEN LOCAL EXCHANGE CARRIERS AND COMMERCIAL MOBILE RADIO SERVICE PROVIDERS

I. INTRODUCTION

1. My name is William E. Taylor. I am Senior Vice President at the National Economic Research Associates, Inc., and head of both its Communications practice and its office in Cambridge, Massachusetts. My business address is One Main Street, Cambridge, Massachusetts 02142.

2. I have been an economist for over twenty years. I received a B.A. degree in economics (Magna Cum Laude) from Harvard College in 1968, a master's degree in statistics from the University of California at Berkeley in 1970, and a Ph.D. in Economics from Berkeley in 1974, specializing in industrial organization and econometrics. I have taught and published research in the areas of microeconomics, theoretical and applied econometrics, and telecommunications policy at academic institutions (including the economics departments of Cornell University, the Catholic University of Louvain in Belgium, and the Massachusetts Institute of Technology) and at research organizations in the telecommunications industry. I have participated in telecommunications regulatory proceedings before state public service commissions, the Federal Communications Commission (FCC) and the Canadian Radio-Television and Telecommunications Commission (CRTC) concerning competition, incentive regulation, price cap regulation, productivity, access charges, pricing for economic efficiency, and cost allocation methods for joint supply of video, voice and data services on broadband networks. I attach a copy of my curriculum vitae as Appendix A to this Affidavit.

II. SUMMARY AND CONCLUSIONS

3. The alleged administrative ease or simplicity of the FCC's proposal to implement bill and keep rates for switched access interconnection between local exchange carriers (LECs) and commercial mobile radio service (CMRS) providers should not be confused with economic efficiency or sound public policy. First, because bill and keep rates ignore termination costs, they are not "policies that are intended to create or replicate market-based incentives and prices for both suppliers and consumers."[1] Second, distinguishing CMRS interconnection from interconnection of other types of networks would introduce a technology bias into U.S. telecommunications policy which is not supported by sound economic reasoning or valid public policy concerns. The resulting differences in interconnection rates for interconnecting carriers of different kinds would create distortions in investment and technology choices and uneconomic incentives to arbitrage the tariffs. Third, implementation of bill and keep pricing would reduce revenues of local exchange carriers, which, in turn, would shift the burden of recovering fixed common costs onto customers of other LEC services. The Notice does not address the need to replace contribution from CMRS interconnection services with contribution from other services. However, because the demand for interconnection is relatively price-inelastic, shifting contribution onto other retail services is likely to reduce economic efficiency and distort emerging competition in the retail local exchange markets. These drawbacks of what is characterized as an interim plan suggest that CMRS interconnection would best be addressed in the FCC's upcoming Access Reform proceeding.

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[1] Interconnection Between Local Exchange Carriers and Commercial Mobile Radio Service Providers, *Notice of Proposed Rulemaking*, ("Notice"), CC Docket No. 95-185, released Jan. 11, 1996, at ¶4.

III. BILL AND KEEP IS NOT A VIABLE INTERIM PRICE STRUCTURE FOR TERMINATING TRAFFIC BETWEEN LECS AND CMRS PROVIDERS

4. The FCC correctly observes that

> With consumers receiving cost-based pricing signals, they purchase communications goods and services only when they receive value greater than or equal to the cost of producing them. In general, reasonable and non-discriminatory rates should give consumers incentives to purchase the combination of services that they most value. As a matter of long-term policy, functionally equivalent services -- including services related to network interconnection -- should be available to all classes of consumers at the same prices, unless there are cost differences or policy considerations that justify different rates.[2]

Despite this observation, it tentatively and surprisingly concludes that a bill and keep arrangement

> represents the best interim solution with respect to terminating access from LEC end offices to LEC end-user subscribers, and with respect to terminating access from equivalent CMRS facilities to CMRS subscribers[3]

and cites three principal reasons: (i) administrative simplicity, (ii) prevention of excessively high interconnection rates stemming from incumbent LEC market power and (iii) economic efficiency if either traffic between networks is balanced or interconnection costs are essentially zero.[4] Unfortunately, none of these conditions is met in the real world, and implementation of bill and keep would lead to serious losses of allocative and technical economic efficiency[5] without offsetting gains from reduced administration costs or from setting prices closer to cost.

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[2] Notice at ¶ 4.

[3] Notice at ¶ 60.

[4] Notice at ¶61.

[5] Allocative inefficiency occurs because customers pay more or less than the incremental economic cost of supplying the service and thus demand either too little or too much of the service. Technical inefficiency occurs when high-cost firms remain in an industry so that services are produced at higher than minimum cost.

A. Bill and keep would make administration more costly rather than less.

5. Under bill and keep, interconnecting carriers terminate each other's traffic without payment changing hands. In theory, one-time and on-going costs of measurement and billing systems could be saved if bill and keep were adopted. In fact, such savings would be illusory. First, systems are currently in place in both LEC and CMRS networks for measurement and billing CMRS providers. Those systems are used for interconnection between LEC and CMRS networks as well as among the networks of different CMRS providers. Second, measurement and billing is currently used to interconnect CMRS networks rather than bill and keep. Cellular carriers pay each other roaming fees when their subscribers make calls from another system rather than having each system absorb the costs of its visitors.

6. Finally, wireline and wireless networks currently terminate each other's traffic through usage-based charges, and administrative complexity would be increased if a different type of termination were required for LEC-CMRS interconnection. Consider an integrated telecommunications company that jointly supplies wireline local exchange, long distance, cellular and PCS services and seeks interconnection with an incumbent LEC. If wireline carriers were charged more than wireless carriers to terminate traffic on the local public switched network, then such integrated network providers would have an incentive to terminate all their traffic through the cheaper technology. In general, if wireline-wireline and wireline-wireless interconnection rates and rate structures were significantly different, considerable administrative resources would be required to distinguish the networks and enforce the tariffs.

B. Bill and keep would not reduce the effects of LEC market power.

7. In a network of interconnecting network service providers where end-users subscribe to the services of only one network provider at a time, it is true that every network provider has some degree of control over the access it gives other network providers to its subscribers.[6] This

[6] For example, it frequently does not pay an interexchange carrier to construct facilities to terminate calls in a residential area, and it must therefore purchase access from the serving LEC.

control over terminating traffic to subscribers is symmetric, however. Regardless of relative size or market share, each network exerts the same degree of control over access to its customers, in the sense that another network that wants to terminate traffic to its subscribers must access its facilities.

8. The Notice expresses concern that when unequally-sized networks interconnect, the larger network may have the incentive and the ability to charge excessive interconnection prices to the smaller network or take other steps to retard competitive entry.[7] In the first place, such behavior presumes that traffic is unbalanced. Regardless of the relative absolute size of the networks, if traffic were balanced, each network would require the same amount of interconnection from the other. In this case, neither network could price interconnection at excessive levels or deny interconnection without subjecting itself to symmetric treatment from the other. Of course, interconnecting calls may be a small fraction of the large carrier's demand and a large fraction of the small carrier's, and to the extent that regulated carriers could exert market power, some regulation would be justifiable. However, the possibility that some prices may be too high cannot justify a regime in which all prices will be too low; i.e., one in which neither network can assess the other a price that reflects its true costs.

9. Second, even if incumbent LEC market power were a problem, bill and keep would not solve it. Bill and keep would prevent an incumbent LEC with market power from raising its interconnection price, but it would not affect its ability to degrade service quality or deny interconnection under reasonable terms and conditions other than price. From the economist's perspective, market power which leads to excessive prices is inefficient because it distorts the relationship between price and incremental cost. As a solution, bill and keep is deficient for the same reason: by requiring no charge for terminating traffic, it assures that prices will differ from incremental cost, regardless of the presence, absence or magnitude of LEC market power.

[7] Notice at ¶12.

10. Third, abuse of LEC market power has not been a noticeable problem for CMRS suppliers, even for interconnection negotiations undertaken before the onset of local competition.

> Most LECs, AT&T, and established cellular carriers, as well as some SMR, paging and PCS providers, support the existing requirement that LECs engage in good faith negotiations over interconnection with CMRS providers. They argue that contractual negotiation is superior to tariffed interconnection, because it permits the greater flexibility needed to respond rapidly to changing interconnection needs. Although many acknowledge that the process of individually negotiating cellular interconnection agreements initially was difficult, they say they are satisfied with the current process.[8]

11. Finally, the Notice expresses concern that negotiated interconnection agreements could be "used as a vehicle to keep the retail price of their respective retail services uneconomically high at the expense of customers."[9] On the whole, however, it would appear more likely that collusion—were it to occur—would be facilitated more by the setting and filing of interconnection tariffs than by a process of negotiated agreements. In connection with long distance competition, the FCC found that concerns of tacit price coordination "are better addressed by removing regulatory requirements that may facilitate such conduct, such as the longer advance notice period currently applicable only to AT&T..."[10] That same logic suggests that individually negotiated interconnection tariffs may be less conducive to collusion than the formal tariff-setting process

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[8] Notice at ¶ 83.

[9] Notice at ¶ 13.

[10] Motion of AT&T Corp. to be Reclassified as a Non-Dominant Carrier, *Order*, released October 23, 1995, ¶83

C. Bill and keep is economically inefficient.

12. From an economist's perspective, bill and keep or mutual traffic exchange is not an efficient means of compensating for termination of calls originating on other networks. Economic principles reveal at least four reasons why bill and keep is not economically efficient.

1. Bill and keep is inefficient because it distorts the carriers' incentives to minimize costs.

13. Under bill and keep, no payment is made by one network provider to the other, which effectively sets the price of terminating usage at zero. Since no payment is made, a provider has no incentive (or the means by which) to recognize the level of terminating access costs it imposes on another network. Thus, each provider has an incentive to minimize only its own cost of *delivering* traffic to the other provider's network, rather than to minimize the total its own traffic delivery costs plus the other provider's terminating access costs. Since terminating costs are not zero, such incentives give rise to inefficient behavior which raises the real costs of telecommunications services to customers.

14. As an example, consider two possible points of interconnection in an incumbent LEC's network: the local switch and the tandem switch. Tandem interconnection requires that traffic be (i) switched at the tandem, (ii) transported to a local switch, where (iii) it is switched again, and finally (iv) distributed to the called party. When interconnection is made at the local switch traffic, the incoming call is switched once and then distributed to the called party. Tandem interconnection thus imposes additional switching and transport costs, which could be avoided were interconnection to take place at the local switch. Of course, new network providers would likely find it more cost-effective to aggregate their traffic in a given area and deliver it to one of NYNEX's tandem switches because such an arrangement would minimize their costs of delivering traffic. Such interconnection would require an incumbent LEC to route the traffic—delivered in aggregated form—to different destinations within its network and, in effect, to absorb all the costs associated with doing so. Thus, under bill and keep, entrants would not face a price which reflects an incumbent's underlying costs of interconnection (call termination,

routing, and delivery). Such pricing will not elicit economic behavior. The price of interconnection is an important signal that provides all network operators with information concerning the costs imposed by their actions. Only when such information is available and customers face the cost consequences of their actions will efficient economic decisions be made.

2. Bill and keep is inefficient because not all carriers have identical costs.

15. Bill and keep does not recognize that current wireless networks and other networks developed by entrants in the future are likely to have different engineering and cost characteristics from the incumbent LEC network already in place. Indeed, the types of competitive local networks seeking mutual interconnection will differ by basic technology, including broadband optical fiber wireline networks and cellular and personal communications service (PCS) radio-based networks. It would be very unlikely for CMRS or entrant networks to have termination costs that are similar to an incumbent LEC's across this range of technologies. If it is more costly to terminate traffic on one network than another, prices that customers face must reflect those cost differences in order to elicit efficient behavior.

16. It is axiomatic that market prices based on underlying costs and market demand conditions are economically efficient. The FCC recognizes that cost-based prices in competitive markets

> ensure optimal utilization of the network by consumers and give service providers accurate information regarding the costs and benefits of introducing new services and incentives for investing in technological innovations.[11]

It is thus economically proper to expect the pricing of local interconnection service to also be based on the actual costs of carriers that provide that service. To the extent that different carriers have different such costs, it is reasonable for the interconnection rate to be reciprocal

[11] Notice at ¶6.

but not necessarily equal. Bill and keep not only ignores the actual costs of call termination but also implicitly regards those costs as being equal---and zero---across carriers.[12]

17. Besides ignoring actual costs and, therefore, providing no economically defensible basis for pricing local interconnection, bill and keep also violates the principle of cost causation. According to this principle, a cost should only be recovered from the source of that cost. Call termination on one network is the result of a call being originated on another network, i.e., the need for call termination would have been avoided had a subscriber on another network not initiated that cross-network call. Economic theory would propose determining the magnitude of that cost and assessing a price high enough to recover that cost from the source. By asking terminating networks to, in essence, recover the cost of call termination from their own subscriber(s) bill and keep stands the cost causation principle on its head. For example, if Network A's cost to terminate a call from Network B is 1¢ a minute while Network B's cost to terminate a call from Network A is 2¢ a minute, asking each network to recover the cost caused by the other from its own subscribers imposes on Network B's subscribers about twice the cost per minute as would be imposed on Network A's subscribers. Bill and keep provides no means by which to recognize this cost difference in the prices that each network's subscribers face.

3. Bill and keep is inefficient because it ignores differences among customer types.

18. Whether or not terminating traffic between entrants and an incumbent LEC would be balanced will depend on the type of subscribers that entrants acquire. It is important to note that the mix of subscribers (and their associated origination-termination ratios) selected to serve would not be independent of the pricing policy for interconnection. If terminating access were

[12] The FCC provides a similar interpretation when it notes: "Bill and keep arrangements yield results that are equivalent to the networks charging one another incremental cost-based rates for shared network facilities if the incremental cost of using such facilities is equal to (or approximates) zero for both networks." Notice at ¶60.

priced at an outrageously high level by an incumbent LEC, the entrant would likely seek subscribers with low origination-termination ratios (i.e., those that make fewer calls to an incumbent LEC's customers than they receive). In contrast, if an incumbent LEC's terminating access were free (or priced less than the entrant's incremental cost of originating traffic), the entrant would seek customers with relatively high origination-termination ratios. By setting the terminating access charge at zero, bill and keep would likely encourage the latter type of behavior. Ironically, because terminating access would be so priced by both networks, both an incumbent LEC and the entrant would have the incentive to seek out subscribers who make more calls than they receive. If the cost of terminating an incoming call exceeds the cost of originating an outgoing call, but the price of termination is set at zero, then both network service providers would try (perhaps by being selective about their subscribers) to maximize the number of outgoing calls relative to the number of incoming calls.

19. There would be two implications of such behavior. First, bill and keep would induce both networks to serve one type of customer (with a high origination-termination ratio) and, unless compelled to do otherwise, not actively seek to serve the customer with the opposite origination-termination call profile. This would inefficiently produce a greater exchange of calls between networks than would be justified by the true cost of call termination. The incumbent's network—which has more termination functions to perform—would have to bear a disproportionately higher amount of the excess cost resulting from the increased traffic flow. Second, bill and keep would obviously favor networks that send more calls than they receive, e.g., CMRS providers.[13] In light of this, it is hardly surprising that bill and keep should be the arrangement CMRS providers most prefer

20. In addition, traffic may not be balanced between carriers, even in the short run, for reasons other than asymmetric termination costs. While there is anecdotal evidence that

[13] In the Notice, the FCC notes that according to Pacific Telesis, 94% of the traffic between it and CMRS networks terminates on its network while only 6% of that traffic terminates on CMRS networks. Notice at ¶40.

similarly-situated customers tend to call each other just as often (a form of "social reciprocity compact"), reciprocity need not hold for traffic between customers who are not similarly situated. For example, traffic between a business and its customers, or between more affluent and less affluent individuals may never be in balance. This would be true not only for the frequency of calling, but for call duration as well. There is no a priori reason to expect that traffic between, say, a major airline or bank and its regular customers or even casual information-seekers will be in balance, even in the long run. The imbalance of origination-termination ratios among certain classes of customers is a fact of life, not an unusual or extreme situation. As the FCC notes, imbalance may well be a pervasive phenomenon in LEC-CMRS traffic exchange. Factors such as cellular customers' reluctance to give out their cellular telephone numbers, charges for cellular air time, limited battery lives of cellular telephones, etc., may account for a substantial portion of that imbalance [14] It is unlikely that such traffic will ever move into balance.

21. When traffic between different service providers is not in balance, bill and keep can have adverse consequences for incumbent LECs such as NYNEX. The carrier that terminates more traffic would have to absorb commensurately more termination costs than the carrier that terminates less traffic. If, in addition, the former carrier's termination cost per minute of traffic were higher, the imbalance in compensation brought about by imbalance in traffic would be even greater. Because NYNEX terminates much more traffic from CMRS providers than it sends to them, bill and keep would put NYNEX at a serious disadvantage as CMRS and landline systems begin to compete to supply local exchange services.

22. Finally, bill and keep can have adverse consequences even if the traffic exchanged by two networks is in balance. For example, when call termination costs differ between the networks, the cost of terminating traffic in one direction would not exactly offset the cost of terminating traffic in the other direction. The network with the higher cost of termination

[14] Notice at ¶40.

would not receive fair compensation under a bill and keep arrangement. Therefore, traffic balance is a necessary, but by no means sufficient, reason for instituting bill and keep.

4. Bill and keep is inefficient because it would shift contribution from all networks' subscribers to the incumbent's subscribers.

23. Most troubling is that bill and keep does not accommodate the requirement that NYNEX be compensated for the lost contribution (i.e., the difference between price and incremental cost) associated with the provision of interconnection or wholesale network functions. Most LEC services—including interconnection—are priced above the relevant incremental costs to contribute towards recovery of (i) the fixed common costs of the ubiquitous network, (ii) subsidies to services priced inefficiently (e.g. basic local services and service to rural customers) to achieve certain regulatory objectives, and (iii) historical costs not yet accounted for because of uneconomic regulatory depreciation rates. Overall, these prices are efficient because they balance the relationship between costs and prices with other regulatory policy objectives. The bill and keep method would permit entrants' customers to avoid paying this contribution despite the facts that (i) NYNEX will continue to maintain a network to fulfill provider of last resort responsibilities, (ii) NYNEX's network (or network elements) will still be used to provision the service offered by entrants, and (iii) NYNEX's retail customers (or its stockholders) must still provide this contribution

D. Internet Pricing is not a Useful Paradigm for Interconnection Between LECs and CMRS Providers

24. Dr. Brock maintains that the Internet is "the best existing example of interconnection under competitive conditions without regulation" and that "[t]he Internet example suggests that "sender keep all" interconnection arrangements are likely to develop in competitive communications markets as the compensation method for mutually beneficial interconnection

arrangements."[15] Dr. Brock's comparison between the Internet and the public switched network is not a valid comparison or a reliable model for network interconnection in competitive markets.

25. The Internet business environment is a poor model for pricing in CMRS and other public switched network markets. Indeed, the origins and development of the Internet infrastructure differs greatly from that of the public switched network, and, of course, the Internet is an unregulated market.[16] Dr. Brock's mistake is to compare the Internet's voluntary agreement among firms made in order to increase their own welfare with the policies of a regulated market which are expected to maximize society's welfare.

26. The Internet began as a program of the U.S. Defense Department, and only recently has U.S. government funding for it diminished. The Internet network is a three-tiered structure. Local area networks (LANs) comprise the bottom rung of the hierarchy. The local networks connect to regional networks which comprise the second rung of the Internet. Finally, the regional networks are connected to one or more backbone networks, which are known as the first-tier service providers. The original backbone of the Internet was the publicly funded NSFNET (National Science Foundation Network) which has since been decommissioned. Some of the mid-level networks continue to receive subsidies from government agencies. In direct contrast to the government-funded origin of the Internet, the public switched network was developed under a regulatory compact in which the backbone network was funded by private investors and firms that have incurred substantial sunk costs to provide universal service under terms and conditions that do not constrain competitive firms.

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[15] Gerald R. Brock, *Price Structure Issues in Interconnection Fees*, March 30, 1995, Prepared for Teleport Communications Group, at 1-2.

[16] The Internet sends and receives communications using a uniform transmission control protocol/Internet protocol (TCP/IP). "Transport of TCP/IP packets is considered to be a "value-added service" and as such is not regulated by the FCC or state public utility commissioners." Jeffrey K. MacKie-Mason and Hal Varian, "Economic FAQs About the Internet," *Journal of Economic Perspectives* 8(3) (Summer 1994), footnote 2.

27. Currently, there are many competitive firms operating on the Internet. Originally, the NSFNET backbone operated under an Acceptable Use Policy, which meant that commercial use traffic was not carried by the backbone. This restriction created the demand for commercially operated Internet Service Providers (ISPs) who would carry traffic for commercial use. Worldwide, there are approximately 4500 to 5000 commercial ISPs operating over the Internet today.[17] None of them faces universal service obligations, regulated profit margins, or restraints on which services they choose to provide, as do firms in the regulated telecommunications industry.

28. While Dr. Brock's contention that the restrictions of the Acceptable Use Policy "led to the formation of the Commercial Internet Exchange (CIX) in August 1991,"[18] is true, the CIX is not the only Internet arrangement with interconnection agreements among member ISPs. The Metropolitan Area Ethernet-East (MAE-East) is one of several other interconnection points in the U.S. Also, there is a less formal peering arrangement between six large ISPs who interconnect without paying each other settlements.[19] Each of these arrangements, including the CIX, is made between firms that believe that the interconnection agreement enhances their firm-specific welfare. Dr. Brock is attempting to associate the actions of these firms with the policy decision of a regulatory body, the FCC, that is concerned with acting in the public

[17] Conversation with Internet consultant at Dimension Enterprises, February 16, 1996. The consultant noted that the definition of an ISP is somewhat flexible. This estimate reflects the number of firms he believes have the capability of connecting to the Commercial Internet Exchange (CIX) interconnection point. Within the U.S., he estimates that there are 3200 firms with that capability. He cautioned, however, that only about 1000 firms worldwide are large enough for it to be worthwhile for them to connect to the CIX interconnection point.

[18] Gerald R. Brock, *Op Cit.*, at 1.

[19] Richard Simnett, Thomas R. Spacek and Padmanabhan Srinagesh. *An Economic Analysis of the Claimed Applicability of the Bill and Keep Interconnection Arrangement to Local Telecommunications Competition*, (Bellcore: 1995), Appendix and Padmanabhan Srinagesh, "Internet Cost Structures and Interconnection Agreements," in *Toward A Competitive Telecommunication Industry: Selected Papers from the 1994 Telecommunications Policy Research Conference*, edited by Gerald W. Brock, (Mahwah, New Jersey: Lawrence Erlbaum Associates, Publishers, 1995) at 266-269.

interest.[20] In its Notice, the FCC notes that the regulated public switched network pursues goals that are not in line with those of an unregulated market

> [B]ecause of the general benefits society derives from universal service, even full competition by itself may not be sufficient to further our public interest goals. In those circumstances, policymakers may need to intervene.[21]

1. The assumptions about traffic flows and transactions under which Dr. Brock says Internet-like arrangements would work are not applicable to the Public Switched Network

29. The peering agreement between the six large ISPs who have adopted a bill and keep interconnection policy contains restrictions on which firms can enter the agreement. The six firms that have entered into the agreement all have national backbones with approximately similar capacities. Further entry into the arrangement is based on acceptance by the six firms already in the agreement. An employee at SprintLink has defined SprintLink's requirements for potential peer networks. The requirements seem designed to ensure that smaller firms which have made little network investment would be unable to take advantage of SprintLink's facilities: "Internet Service Providers...with large sunk costs realize that they can be gamed by smaller providers who have made little investment in the underlying transport infrastructure."[22] According to one observer,

> new entrants without large national backbones will not be able to enter Bill & Keep arrangements with the six incumbents. They will be treated as customers or end users, and not as peering network providers. In (the reporter's) interpretation, the Internet Bill & Keep model is not a stable, competitive arrangement that is open to small entrants. Instead, Bill & Keep appears to be

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[20] Notice at ¶8. The Communications Act provides that carriers shall offer interconnection when it is determined to be in the public interest

[21] Notice at ¶7.

[22] Richard Simnett, Thomas R. Spacek and Padmanabhan Srinagesh, *Op Cit.*, at 14. A consultant with Dimension Enterprises explained that presently both MCI and Sprint require any potential peer to have three meetpoints at major interconnection points such as the CIX or MAE-East, and to have a presence in two of the three national regions, namely, east, mid-west, and west. (Based on a telephone conversation on February 16, 1996.)

> an agreement among approximately equal network service providers. Smaller providers are required to pay at least one of the six for...connectivity. These payments are...asymmetric, with revenue flowing from the smaller network to one of the larger ones. In this sense the Internet interconnection framework includes arrangements that resemble the access charges paid by IECs (Inter-Exchange Carriers).[23]

Clearly Dr. Brock's example of bill and keep interconnection agreements in the Internet is flawed when used as an analogy for interconnection in the telephone industry.

30. Other differences between the Internet network and the public switched network also invalidate Dr. Brock's assumption that bill and keep is an appropriate policy for both networks. According to Dr. Brock, because the bill and keep method has been adopted by firms operating on the Internet, it is likely that the Internet network is configured such that termination costs are "low in relationship to transaction costs of measuring and charging for traffic...."[24] This may be because the Internet uses packet switching, while voice telephone services are circuit switched. Packet switching is optimal for data transmission rather than voice transmission. It is also harder to "do detailed accounting for (packet)-switched network(s)."[25] In comparison, public switched network architecture is more compatible with (is designed to permit) measuring and charging for usage.

2. Bill and keep is not the sole, or the best, interconnection arrangement on the Internet.

31. Transit services are another example of Internet interconnections that often involve settlement payments. When two networks require that traffic between them be routed over the

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[23] Richard Simnett, Thomas R. Spacek and Padmanabhan Srinagesh, *Op Cit.* at 15-16, discussing Gordon Cook, *The COOK Report on Internet*, August 1995 (Vol. 4, No. 5).

[24] Gerald R. Brock, *Op Cit.*, at 4. We assume that Dr. Brock does not believe that his other prerequisite for bill and keep, balanced traffic flows, exists in the Internet environment.

[25] Jeffrey K. MacKie-Mason and Hal Varian, *Op Cit.* at 80. The authors note however in their paper *Pricing the Internet*, 1994, that they expect costs of accounting over the Internet to decrease. One "example is to have the billing information transmitted, and the bank account debited, through the network rather than through off-line printed bills and checks written several weeks later." (at 14, footnote 25.)

network of a third firm because the two are not directly connected. the third network provides what is known as a transit service. The transit network "typically bill(s) at least one of the two networks to which they connect."[26]

32. Among the advocates for adopting cost-based pricing in the Internet, MacKie-Mason and Varian propose a cost-based pricing system for preventing congestion on the Internet. They base their system on the "general rule (that) users should face prices that reflect the resource costs that they generate so that they can make informed decisions about resource utilization."[27] Furthermore, the CIX Executive Director recently said that a "rough consensus is emerging among 'first tier' players that some sort of settlement mechanism is needed in the next two years...."[28] A consultant for Dimension Enterprises who works for CIX defined first-tier ISPs as those large enough to operate on a global basis which, in effect, includes the larger backbone networks.[29]

E. Dr. Brock's Analysis in Support of Bill and Keep is Flawed

33. The proper way to regulate prices is to adopt the correct theory and then to apply that theory as accurately as possible within real-world constraints. As Dr. Alfred E. Kahn has noted:

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[26] Richard Simnett, Thomas R. Spacek and Padmanabhan Srinagesh, *Op Cit.* at 14. However, if the transit network has bill and keep arrangements with both the originating and terminating networks, there will be no settlement payment(s).

[27] Jeffrey K. MacKie-Mason and Hal Varian, *Pricing the Internet*, 1994, at 19.

[28] "Internet Providers Want Body to Manage Growth," *Communications Week International*, August 7, 1995, at 6. In this article, MCI's Director of Internet Marketing said, "Settlements should be at least considered." One of the largest Internet providers, on the other hand, stated that settlements are "fundamentally unnecessary." In his paper Internet Cost Structures and Interconnection Agreements, (in *Toward A Competitive Telecommunication Industry: Selected Papers from the 1994 Telecommunications Policy Research Conference*, edited by Gerald W. Brock, at 272) Padmanabhan Srinagesh explains that there is some dissatisfaction with the CIX and that this is "symptomatic of an evolving market where prices have not lined up neatly with costs."

[29] Based on a telephone conversation on February 16, 1996.

> The first volume of (my) book is called Economic Principles and when I became a regulator, I devoted myself conscientiously to putting those principles into effect and the advice that I am offering and have been offering throughout is an advice based on economic principles that I think are indisputable....
>
> (I)t's one thing to say applying those principles and estimating the costs...is a question of judgment and estimating and is not a science;...in getting the principles right...and then attempting to approximate those principles using judgment. There is all the difference in the world between that and saying, well, I'm just going to use my judgment without regard to principles....
>
> I'd like to give you one illustration that I think is very graphic. There is all the difference in the world between saying, "There is a black cat in a dark room and I am going to try to estimate its dimensions" and saying secondly, "There's a dark room and there is no cat there at all." The first is what I'm talking about, there is a cat there and what we have to do is try to estimate its dimensions.[30]

34. In the present proceeding, the correct theory holds that rates should be based on costs and customers should face prices that reflect the costs they impose on the supplier. Dr. Brock apparently agrees with these principles: he cites a report for the European Commission released in November of 1994 that "recommended that interconnection rates be based on cost," and he observes that "the principles developed in that study are...applicable to the U.S. telecommunication market."[31] He further states that if either of the two requirements holds "[w]e should expect to see "sender keep all" arrangements develop in a competitive communications market."[32] The requirements are that either (i) traffic must be "roughly" balanced between the carriers or (ii) the cost of terminating traffic must be relatively low when compared to the administrative or transaction cost of measuring and charging for traffic.[33] As I

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[30] Cross-Examination of Alfred E. Kahn in the Rulemaking Proceedings for IntraLATA Toll on a Presubscription Basis Before the New Jersey Board of Public Utilities, on June 21, 1995, transcript pages 3711-3713.

[31] Gerald R. Brock, *Op Cit.*, at 2-3

[32] *Ibid.* at 3.

[33] *Ibid.* at 3-4.

stated earlier, the first requirement is unlikely to be met by CMRS-LEC interconnection because traffic between the wireline and wireless firms in the telecommunications environment is not "roughly balanced" and adoption of bill and keep pricing would tend to increase that imbalance. The second requirement does not hold because LEC interconnection costs—though small per minute—are not negligible.

35. Dr. Brock notes that "[i]f traffic is primarily one way, it may be necessary for the company that is terminating the traffic to impose interconnection charges as compensation for the service it provides to the other company."[34] This leads Dr. Brock to contemplate a bill and keep policy as appropriate in the LEC-CMRS market only during the off-peak hours when the marginal cost of terminating a call is close to zero and the effect of the unbalanced traffic flows between the two types of providers is minimized.[35] These conditions are an unrealistic depiction of the LEC-CMRS traffic flows and cost levels. In addition, Dr. Brock does not show that the cost of terminating traffic is relatively low when compared to the transaction costs of measuring and charging for traffic during off-peak periods. Instead, he relies on a study of the incremental cost of telephone usage that determined that—on average—the cost of a phone call is approximately 0.2 cents per minute and the assumption that "most of the minutes during a year impose no incremental cost on the local exchange because they occur at off peak times."[36]

36. As the FCC notes, Dr. Brock's assumption that the costs of terminating a call are the same as the costs for telephone usage appears to lead Dr Brock "not to consider the costs associated with the physical transmission circuits connecting CMRS MTSOs with LEC end offices."[37] Also, the study he relied upon does not appear to account for the fact that it is more

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[34] Gerald R. Brock, *Op Cit.*, at 1

[35] Gerald R. Brock, *Interconnection and Mutual Compensation with Partial Competition*, prepared for Comcast, at 13-14.

[36] Gerald R. Brock, *Price Structure Issues in Interconnection Fees*, March 30, 1995, Prepared for Teleport Communications Group, at 5

[37] Notice at ¶ 63.

costly for CMRS providers to terminate phone calls.[38] The FCC recognizes the importance of accurately including measuring asymmetric costs.

> Asymmetrical, cost-based rates have the benefit of providing each of the carriers (and if passed through to them, their customers) incentives to use resources such as interconnection commensurate with the actual cost of those resources.[39]

Furthermore, nowhere in his three papers does Dr. Brock attempt to quantify the transaction costs of measuring and charging for interconnection traffic. Those costs are likely to be small, particularly if traffic is already being measured and billed to the end user.

37. Dr. Brock agrees that the proper theory is to apply cost-based rates. However, he relies upon a study of telephone usage (and not of the incremental cost of terminating a call) and that study may not be accurate in its assumption that transaction costs are large compared to the cost of terminating a call. Surely those transaction costs should be measured before the theory is thrown away. The fact that incremental usage costs are absolutely small (a penny or less) does not imply that usage or interconnection costs are small in total or in economic effect, since those costs apply to a large volume of minutes. Dr. Brock has not shown that either of his prerequisites for the development of a bill and keep policy in a competitive environment holds with regard to the wireless-wireline market.

38. Dr. Brock recommends applying the NYNEX-Teleport agreement as a model of peak use measurement to LEC-CMRS interconnection agreements. There are, of course, practical

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[38] Notice at ¶ 27. "Point claims...it is more expensive for a CMRS carrier to terminate a call than it is for a LEC to terminate a call." Notice at ¶ 31. "Pacific Bell responds that... the costs of terminating traffic on CMRS and LEC networks may well differ and justify different compensation rates." The fact that Dr. Brock overlooked a difference in termination costs between wireline and wireless providers not only shows that his conclusion that the cost of terminating traffic is relatively low is suspect, it shows a flaw in his first condition for the development of a bill and keep policy. Namely, his assertion that traffic must be "roughly" balanced between the carriers for the development of a bill and keep policy seems too simplistic. In light of the possibility that the two sides interconnecting might have differing costs, perhaps a better explanation would be that an efficient scenario under which bill and keep could develop would be if the traffic flows between the interconnected firms were such that the *total costs of termination* for the two firms were roughly balanced.

[39] Notice at ¶ 79.

problems in implementing a peak-sensitive pricing system for an intermediate good such as interconnection,[40] so that all of the theoretical welfare gains from optimal pricing may not be achievable in practice. In general, these problems include (i) the inability to charge many different tariffs depending on demand conditions, and (ii) the possible shifting of the peak period with the implementation of an off-peak discount. For peak-period pricing of interconnection services, the problems are more complex. First, the customer pays a retail price, not the interconnection charge, and the retail price may average together different interconnection charges from the different geographic areas served by the retail network. Second, the retail price reflects peak-load characteristics of the retail supplier, of which only one component is the peak-load differential for interconnection charges. Different networks may have different time-of-day load distributions as do different facilities in the same network. For these reasons, time-of-day pricing for carrier access charges has been an attractive principle discussed since the days of Docket No. 78-72, but the FCC and the industry have been unable to implement such a tariff.

39. Dr. Brock recommends flat capacity use charges to recover the costs of termination. This may not be the best method of recovery because not all of the network costs cover dedicated facilities, and shared facility costs should be recovered through usage-based pricing. The cost structure for facilities used by the LEC to provide interconnection would generally have two components: (i) the capacity or fixed cost (as Dr. Brock suggests) based on peak-period traffic and engineered to meet agreed-upon service quality standards, and (ii) the usage-based or variable cost arising from the shared use of facilities. The omission of the latter component is a serious source of error in Dr. Brock's recommendation of a flat rate structure for interconnection. By leaving out an important element of cost, the proposed prices could fall below the LEC's true cost of providing interconnection, and by removing usage-sensitive costs

[40] See, e.g., Notice at ¶ 45.

from the calculation, the proposed price structure could give interconnecting carriers inefficient incentives to underengineer or overload their interconnecting trunks.

F. Economically inefficient pricing signals will result in inefficient competition

40. The Commission's stated "interest in facilitating the competitive development of CMRS"[41] must not be stretched to create a regulatory bias in favor of wireless over traditional wireline technology. Telecommunications services are evolving along two very different paths: wireline facilities provide increasing bandwidth to homes and offices for video, computer and data applications while wireless applications supply narrowband services to mobile customers. The particular market niches that each technology will ultimately serve depend on the unknown interplay among costs, service applications and consumer tastes, and market forces are far better suited to sorting these out than are the good intentions of planners or regulators.

41. Incentives to produce the socially most efficient outcome are diminished under bill and keep. The price of interconnection is an important signal that provides all carriers information concerning the costs imposed by their actions. Only when such information is available and carriers face the cost consequences of their actions will competition lead to efficient economic outcomes.

G. State regulators have not embraced bill and keep pricing.

42. There has been no precipitous rush to transplant bill and keep compensation from the interconnection-among-contiguous-LECs world to the interconnection-among-competing-LECs world. Commissions that have considered bill and keep arrangements for interconnection in local exchange competition have either adopted it on an interim basis with reservations, or rejected it outright. Thus, the record provides no compelling reason for the FCC to consider adopting bill and keep for CMRS interconnection even as an interim measure.

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[41] Notice at ¶ 17.